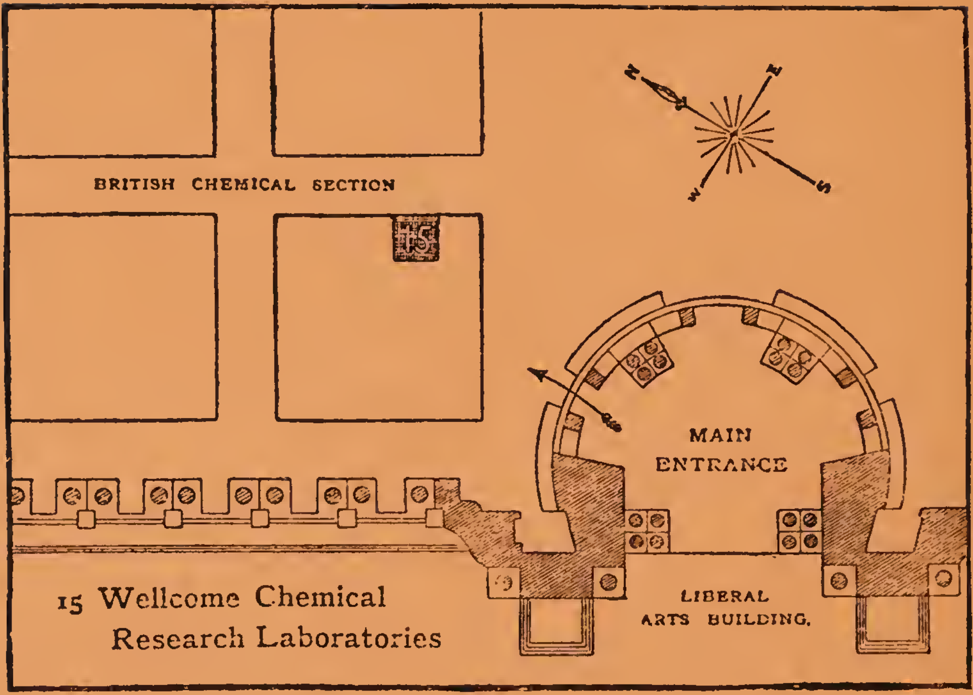
THE 'WELLCOME' CHEMICAL RESEARCH LABORATORIES, LONDON

FREDERICK B. POWER Ph.D.
DIRECTOR

WELLCOME COLL.
/(16)

TH NOTES ON THE EXHIBIT
THE ST. LOUIS EXPOSITION

INTERNATIONAL EXPOSITION, ST. LOUIS, 1904



Key Plan to Exhibit

22501691087

THE WELLCOME

CHEMICAL RESEARCH LABORATORIES

EXHIBIT

AT THE ST. LOUIS EXPOSITION

1904

FREDERICK B. POWER, PH. D.
Director of the Laboratories

KING STREET, SNOW HILL, LONDON, ENG.

N.A. 7.

Wellcome Collection (16)

Wellcome Library
for the History
and Understanding
of Medicine

CONTENTS

PAGE

Notes on the Exhibit of the Wellcome Chemical Research Laboratories, at the International Exposition, St. Louis, 1904 3

Results of work 4

List of Specimens Exhibited 8

List of Botanical and Materia Medica Specimens Exhibited 12

Titles of Published Papers ... 13, 14

View of the Exhibit of the Wellcome Chemical Research Laboratories at the St. Louis Exposition 15

Views of the Interior of the Laboratories 16, 17

Exterior View of the Laboratories ... 18

Organisation, Equipment, and Development 19

"The Times" (London) on the Wellcome Chemical Research Laboratories 24

The Speeches on the occasion of the founding of the Laboratories ... 25

EXHIBIT OF THE WELLCOME CHEMICAL RESEARCH LABORATORIES, AT THE INTERNATIONAL EXPOSITION, ST. LOUIS, 1904

Liberal Arts Building, British Chemical Section,
Department C, Group 23, Exhibit No. 15

This exhibit is designed to be illustrative of work accomplished in the Wellcome Chemical Research Laboratories, and in connection therewith it has been deemed of interest to present a concise description of it, in order to indicate the purpose and extent of the scientific researches upon which it is based.

The work undertaken in these Laboratories—founded by Mr. Henry S. Wellcome in the year 1896, and since then under the direction of Dr. Frederick B. Power—has been of a most varied character and wide range, representing almost every department of chemical and pharmaceutical science. The investigations have comprised, for example, the devising of new methods of analysis; the examination of drugs of reputed medicinal value from remote regions in both hemispheres, as well as those indigenous to Europe and North America, in order to determine both the nature of their active chemical constituents and their pharmacognostical characters; the study of the constituents of various essential oils; the constitution of some of the more important alkaloids and other chemical substances of special therapeutic value; and the preparation of new chemical compounds by synthetic methods, both chemical and electrolytic.

The detailed results of these investigations have been published, for the most part, in various scientific periodicals and transactions, such as the *Journal of the Chemical Society*, London, the *Journal of the Society of Chemical Industry*, the *Year Book of Pharmacy*, the *British Medical Journal*, and the *Proceedings of the American Pharmaceutical Association*. These published papers, at present forty-four in number, have been distributed from time to time to such institutions and persons as have been thought would be specially interested in the subjects of which they treat.

In the following remarks an attempt has been made to outline briefly the results of work thus far accomplished.

A NEW TYPE OF GOLD SALTS.—Some observations made during the course of an analysis led to the discovery of a new type of gold salts of the alkaloids, of which those of atropine, hyoscyamine, and hyoscine were prepared and characterised. (*Journ. Chem. Soc.*, 1897, **71**, pp. 679-682.)

THE OFFICIAL HYPOPHOSPHITES.—The chemical characters of these have been more definitely established, and a reliable method devised for the determination of their purity. (*Year Book of Pharmacy*, 1898, pp. 409-423.)

ACID PHENYLIC SALTS OF DIBASIC ACIDS.—A general method for the preparation of acid phenylic salts of dibasic acids has been developed, and a number of such new compounds having valuable medicinal properties were prepared, among which may be mentioned guaiacol camphorate and creosote camphorate. (*Journ. Chem. Soc.*, 1899, **75**, pp. 661-669.)

ASSAY OF COMMERCIAL PHENOLS.—In direct connection with the preceding investigation, a new method was devised for the assay of commercial phenols. (*Journ. Soc. Chem. Ind.*, 1899, **18**, pp. 553-556.)

THE ALKALOIDS OF JABORANDI LEAVES.—An extended and exhaustive research was undertaken for the purpose of elucidating the nature of the alkaloids of jaborandi leaves, with special reference to the chemical constitution of the alkaloids pilocarpine and *iso*pilocarpine. This investigation, which occupied four years, and required the use of large quantities of very valuable material, was finally brought to a successful issue by establishing for the first time the true constitution of these alkaloids. (*Journ. Chem. Soc.*, 1900, **77**, pp. 473-498, 851-860; 1901, **79**, pp. 580-602, 1331-1346; 1903, **83**, pp. 438-464; also *Year Book of Pharmacy*, 1899, pp. 435-441, and *British Medical Journal*, 1900, pp. 1074-1077.)

GLYOXALINE AND PYRAZOLE DERIVATIVES.—In connection with the preceding researches on pilocarpine, some new substances, glyoxaline and pyrazole derivatives, were synthetically prepared, and their properties carefully determined. (*Journ. Chem. Soc.*, 1903, **83**, pp. 464-470.)

COMPOSITION AND CHARACTER OF CERIUM OXALATE.—The unsatisfactory pharmacopœial description and tests of cerium oxalate suggested an enquiry into the composition and character of this medicinal chemical. The methods for the separation of cerium from its associate elements were critically compared, and on the basis of these experiments a plan was devised for the quantitative determination of the amount of pure cerium oxalate in the commercial products. (*Journ. Soc. Chem. Ind.*, 1900, **19**, pp. 636-642.)

RESEARCHES ON MORPHINE.—In order to ascertain the relationship existing between the physiological action and the chemical constitution of morphine, a number of new derivatives of this alkaloid were prepared and physiologically tested, and some new products having a chemical structure analogous to that of morphine were also prepared by electro-synthesis. The latter compounds gave rise to considerations involving some interesting points in chemical dynamics. (*Journ. Chem. Soc.*, 1900, **77**, pp. 1024-1039; 1901, **79**, pp. 563-580; 1903, **83**, pp. 750-763.)

COMPOSITION OF BERBERINE PHOSPHATE.—As considerable discrepancy had existed in chemical literature respecting the formula for berberine phosphate, in the course of some more extended work on berberine salts the true composition of the phosphate was determined. (*Year Book of Pharmacy*, 1900, pp. 507-513.)

SOLUBLE MANGANESE COMPOUNDS.—The desirability of rendering manganese available for medicinal use in a soluble and easily assimilable form, led to some experiments resulting in the production of a soluble manganese citrate and a compound of the latter with iron, as also a soluble iron and manganese phosphate. These were all obtained in the form of brilliant scales. (*Year Book of Pharmacy*, 1901, pp. 458-465.)

(I.) SO-CALLED IODO-TANNIN COMPOUNDS; (II.) SOME NEW DERIVATIVES OF GALLIC ACID.—For many years, preparations have been used medicinally which have been regarded as actual chemical compounds of iodine and tannin, and somewhat extended observations have been recorded, especially in pharmaceutical literature, which were supposed to confirm this view. This subject was therefore fully investigated in these laboratories, and it was proved that the action of iodine upon tannic acid does not result in the formation of any compound of the latter containing this element. In the subsequent endeavour to prepare a definite compound of iodine and gallic acid, several new and interesting derivatives of the latter were obtained. (*Year Book of Pharmacy*, 1901, 466-476, and *Journ. Chem. Soc.*, 1902, **81**, pp. 43-48.)

ESSENTIAL OILS OF ASARUM CANADENSE, RUE, AND CALIFORNIAN LAUREL.—Three essential oils have been examined with reference to the nature of their constituents, and the latter in some instances were made the subject of further and independent chemical study. They comprised (1) the oil of *Asarum canadense*; (2) an oil of rue; (3) the oil of Californian laurel. The many interesting constituents of these natural products are shown in connection with specimens of the original oils from which they were isolated. *(Journ. Chem. Soc.*, 1902, **81**, pp. 59-73, 1585-1594; 1904, **85**, pp. 629-646.)

BENZOXY-OLEFINES.—The investigation of the above-mentioned essential oil of rue led to a special study of the interaction of ketones and aldehydes with acid chlorides. This was shown to result in the formation of a class of substances known as benzoxy-olefines, and one of the particularly interesting products obtained was the benzoate of the enolic modification of camphor. *(Journ. Chem. Soc.*, 1903, **83**, pp. 145-154.)

ANTHRAQUINONE DERIVATIVES.—An exhaustive investigation into the nature of certain anthraquinone derivatives occurring in nature has been undertaken, and is still being pursued. The results of an examination of commercial chrysarobin, for many years supposed to be chrysophanic acid, and of an enquiry pertaining to the constitution of chrysophanic acid and of emodin, have already been published. *(Journ. Chem. Soc.*, 1902, **81**, pp. 1575-1585; 1903, **83**, pp. 1327-1334.)

CONSTITUENTS OF CHAULMUGRA SEEDS.—An investigation of the constituents of chaulmugra seeds has been undertaken, and, although still in progress, some exceedingly interesting results have already been obtained.

(I.) SALINIGRIN—A NEW GLUCOSIDE; (II.) COMPARATIVE EXAMINATION OF WILLOW AND POPLAR BARKS.—As already indicated, considerable attention has been devoted to the investigation of crude drugs possessing either medicinal or technical value. For example, the examination of a specimen of commercial willow bark led to the discovery of a new glucoside, salinigrin. This was shown to be the glucoside of m-oxybenzaldehyde. *(Journ. Chem. Soc.*, 1900, **77**, pp. 707-712.) By the subsequent examination of a large number of different species of American and British willows it was ascertained that the particular species yielding salinigrin is *Salix discolor*, Muhl. At the same time some very interesting variations were observed respecting the amount of salicin contained in these barks at different seasons of the year, and in trees of different sex. *(Year Book of Pharmacy*, 1902, pp. 483-490.)

Among other drugs of which a thorough examination has been made, the following may be mentioned :—

ROBINIA PSEUD-ACACIA, Linn.—Several years ago one of the present investigators had isolated from the bark of this tree a very poisonous proteid, termed robin. The characters of this principle have now been somewhat further studied. (*Year Book of Pharmacy*, 1901, pp. 349-372.)

DERRIS ULIGINOSA, Benth.—The stem of this plant is used in the Far East as a fish poison. This property was found to reside in a resin, which, together with other constituents of the drug, was chemically examined. (*Proc. Amer. Pharm. Assoc.*, 1902, **50**, pp. 296-321.)

KÔ-SAM SEEDS (*Brucea Sumatrana*, Roxb.).—This drug was obtained from the East Indies. It has recently been brought prominently to notice on account of its reputed value in the treatment of tropical dysentery. The seeds yield a large amount of fatty oil, which was very completely examined. Two bitter principles were also isolated, and certain statements of previous investigators regarding the character of these were shown to be erroneous. (*Year Book of Pharmacy*, 1903, pp. 503-522.)

CASCARA SAGRADA.—An exhaustive chemical examination has been made of perfectly authentic barks, especially collected for the purpose. In the course of this investigation, particular attention has been paid to the numerous discrepancies of statement in the literature of the subject, with the endeavour to afford a correct presentation of the facts respecting the constituents of these valuable medicinal barks.

PHARMACOGNOSY OF STROPHANTHUS, ROBINIA AND DERRIS.—In the department of pharmacognosy very careful studies have been made of the anatomical characters of strophanthus seeds, robinia bark, and derris, thus in several cases supplementing the previously mentioned chemical examination of the respective drugs. The descriptive details of this work are elucidated by a number of handsomely executed original drawings. (*Year Book of Pharmacy*, 1900, pp. 366-393; *Pharm. Journ.*, 1901, **66**, pp. 518-521; *Year Book of Pharmacy*, 1901, pp. 372-382; *Proc. Amer. Pharm. Assoc.*, 1902, **50**, pp. 321-331.)

ANATOMY OF THE SALICACEÆ.—An exhaustive investigation of the comparative anatomy of the barks of the *Salicaceæ* is also in progress, and the first part of this work, treating of the poplars, has already been published. (*Year Book of Pharmacy*, 1903, pp. 442-479.)

List of Specimens Exhibited

The Essential Oil of Asarum Canadense

Constituents of the Oil

- Pinene
- Linalool
- Linalyl Acetate
- Geraniol
- Geranyl Acetate
- Borneol
- Bornyl Acetate
- Terpineol
- Eugenol Methyl Ether
- Blue Oil
- Palmitic Acid

The Essential Oil of Algerian Rue

Constituents of the Oil

- Methyl-n-heptylketone
- Methyl-n-nonylketone
- Methyl-n-heptylcarbinol
- Methyl-n-heptylcarbinyl Acetate
- Methyl-n-nonylcarbinol
- Blue Oil
- Methyl Salicylate
- Pinene
- Limonene
- Cineol

The Essential Oil of Californian Laurel

Constituents of the Oil

- Eugenol
- Pinene
- Cineol
- Umbellulone
- Eugenol Methyl Ether
- Safrol

Substances Isolated from Chaulmugra Seeds

- Chaulmugra Oil
- Total Fatty Acid
- Chaulmugric Acid
- A hydrolytic Enzyme

Derivatives of Chaulmugric Acid

- Ammonium Chaulmugrate
- Potassium Chaulmugrate
- Magnesium Chaulmugrate
- Zinc Chaulmugrate
- Manganese Chaulmugrate
- Chaulmugric Amide
- Ethyl Chaulmugrate
- Lithium Chaulmugrate
- Calcium Chaulmugrate
- Iron Chaulmugrate
- Copper Chaulmugrate
- Lead Chaulmugrate
- Methyl Chaulmugrate
- Dihydrochaulmugric Acid
- Monobromodihydrochaulmugric Acid
- Methyl Dihydrochaulmugrate

Salts of the Alkaloids of Jaborandi Leaves

- Pilocarpine Nitrate
- Pilocarpine Hydrochloride
- Pilocarpine Hydrobromide
- *iso* Pilocarpine Nitrate
- *iso* Pilocarpine Hydrobromide
- Pilocarpidine Nitrate

SUBSTANCES RELATING TO THE CONSTITUTION OF PILOCARPINE

iso Pilocarpinolactone
Pilopic Acid
Pilopic Amide
Barium Pilocarpinate
Dibromo*iso*pilocarpine
Dibromopilocarpine
α-Ethyltricarballylic Acid, from Homopilopic Acid
Dibromo*iso*pilocarpinic Acid
α-Ethyltricarballylic Acid, synthetic
Barium Hydroxypilopate
Ethylic α-ethyl-β-cyanotricarballylate
1 : 3-Dimethylpyrazole
1 : 3-Dimethylpyrazole Methiodide
4 : 5-Dibromo—1 : 3-dimethylpyrazole
4 (or 5) Methylglyoxaline
Methylamylglyoxaline Platinichloride
1 : 4 (or 1 : 5)-Dimethylglyoxaline
1 : 4 (or 1 : 5)-Dimethylglyoxaline Picrate
1 : 2-Dimethylglyoxaline
1 : 2-Dimethylglyoxaline Platinichloride
Ethylic ethylcyanosuccinate

THE CONSTITUENTS OF COMMERCIAL CHRYSAROBIN AND SUBSTANCES RELATING TO THE CONSTITUTION OF CHRYSOPHANIC ACID AND OF EMODIN

Chrysarobin
Acetylmethyldichrysarobin
Methyldichrysarobin
Dichrysarobin
Triacetylchrysarobin
Chrysophanic Acid from Chrysarobin
Chrysarobin, commercial
3 : 5 Dioxydimethylanthraquinone
Emodin Monomethyl Ether
Diacetyldimethyldioxyanthraquinone
1 : 5 Dioxydimethylanthraquinone

MORPHOLONES, AND DERIVATIVES PRODUCED BY ELECTRO SYNTHESIS

N-Methylphenmorpholine Hydrochloride
Ethenylorthoaminophenol
N-Acetylmethylorthoaminophenol
N-Methylorthoaminophenol Hydrochloride
α-Nitro-β-naphthoxyacetic Acid
β-Naphthomorpholone
N-Methyl-β-naphthomorpholone
Acetyl-N-methylethyl-α-amino-β-naphthol
N-Methylethyl-α-amino-β-naphthol sulphocamphylate

Substances isolated from Kô-sam Seeds

- Fatty Oil
- Oleic Acid
- Stearic Acid
- Palmitic Acid
- Hentriacontane
- A crystalline Alcohol
- Bitter Principle
- A hydrolytic Enzyme

Substances isolated from Cascara Bark

- Emodin
- Arachidic Acid
- Rhamnol
- Rhamnol Acetate
- Syringic Acid
- Linolic Acid
- An Enzyme

New derivatives of Gallic Acid

- Ethyltriacetylgallate
- Ethyldinitrodiacetylgallate
- Ethyldinitrotriacetylgallate
- Ethyldinitrogallate
- Sodium Ethyldinitrogallate
- Ethylmonaminogallate Hydrochloride
- Diazoethylgallate

Substances obtained in Researches on Morphine

- Chloromorphide
- Chloromorphide Hydrochloride
- Chloromorphide Hydrobromide
- Acetylchloromorphide
- Bromomorphide
- Bromomorphide Hydrochloride
- Bromomorphide Hydrobromide
- Isomorphine Hydrochloride
- Isomorphine Hydrobromide
- Deoxymorphine Hydrochloride
- Bromocodeide
- Isomorphine

Phenylic Salts of Dibasic Acids

- Eugenyl Hydrogen Camphorate
- Guaiacyl Hydrogen Camphorate
- Guaiacyl Camphorate
- Guaiacyl Zinc Camphorate
- Naphthyl Hydrogen Camphorate
- Phenyl Hydrogen Camphorate
- Guaiacyl Hydrogen Succinate
- Thymyl Hydrogen Camphorate
- Thymyl Hydrogen Succinate
- Thymyl Hydrogen Phthalate
- Creosote Hydrogen Camphorate
- Menthyl Hydrogen Camphorate
- Santalyl Hydrogen Camphorate

Benzoxy-olefines

β-Benzoxyundecylene
β-Valeroxyundecylene
β-Benzoxynonylene
β-Benzoxy-γ-methylheptylene
β-Benzoxyhexylene
α-Benzoxy-α-phenylethylene
α-Benzoxyheptylene
Benzoxycamphene

Substances isolated from Derris

Derris Resin (soluble in chloroform)
Derris Resin (insoluble in chloroform)
Cholesterol
Arachidic Acid
Stearic Acid
Ceryl Alcohol

The active principle of Robinia Pseud-acacia

Robin

Substances illustrating the investigation of Cerium Oxalate

Cerium Oxalate
Cerium Oxide
Didymium Oxalate
Didymium Oxide
Lanthanum Oxalate
Lanthanum Oxide

Substances used in the investigation of the Hypophosphites

Calcium Hypophosphite
Potassium Hypophosphite
Sodium Hypophosphite

New preparations of Manganese and Iron

Manganese and Iron Citrate
Manganese and Iron Phosphate
Manganese Citrate, soluble
Ferric Hypophosphite, soluble

Salinigrin and its Hydrolytic Products

Salinigrin
Glucose
Metahydroxybenzaldehyde

Berberine Phosphate

A Synthetic Ketone

Methyl-β-methylhexylketone

New Gold Salts of Hyoscine and Hyoscyamine

Hyoscine Hydrobromide Gold Chloride
Hyoscyamine Hydrobromide Gold Chloride

LIST OF BOTANICAL AND MATERIA MEDICA SPECIMENS EXHIBITED

Aleppo galls (*Quercus infectoria + Cynips Gallæ tinctoriæ*)
Belladonna root (*Atropa Belladonna*)
Californian Laurel leaves (*Umbellularia californica*)
Cascara Sagrada (*Rhamnus californicus*)
Cascara Sagrada (*Rhamnus Purshianus*)
Chaulmugra seeds (*Taraktogenos Kurzii*)
Derris pods (*Derris uliginosa*)
Derris stems (*Derris uliginosa*)
Golden Seal rhizome (*Hydrastis canadensis*)
Henbane leaves (*Hyoscyamus niger*)
Jaborandi leaflet (*Pilocarpus Jaborandi*)
Jaborandi leaflets (*Pilocarpus microphyllus*)
Jaborandi leaflet (*Pilocarpus pennatifolius*)
Kô-sam seeds (*Brucea sumatrana*)
Locust Bark (*Robinia Pseud-acacia*)
Poplar Bark (*Populus angustifolia*)
Poplar Bark (*Populus balsamifera*)
Poplar Bark (*Populus grandidentata*)
Poplar Bark (*Populus monilifera*)
Poplar Bark (*Populus tremuloides*)
Rhubarb rhizome (*Rheum officinale* [?])
Rue herb (*Ruta graveolens*)
Strophanthus pods (*Strophanthus Kombe*)
Strophanthus seed (*Strophanthus Arnoldianus*)
Strophanthus seed (*Strophanthus Courmonti*)
Strophanthus seed (*Strophanthus Courmonti var. fallax*)
Strophanthus seed (*Strophanthus Courmonti var. Kirkii*)
Strophanthus seed (*Strophanthus gratus*)
Strophanthus seed (*Strophanthus hispidus*)
Strophanthus seed (*Strophanthus Kombe*)
Strophanthus seed (*Strophanthus Nicholsoni*)
Strophanthus seed (*Strophanthus Nicholsoni*, immature)
Strophanthus seed (*Strophanthus Preussi*)
Wild Ginger rhizome (*Asarum canadense*)
Willow Bark (*Salix discolor*)

TITLES OF PUBLISHED PAPERS FROM THESE LABORATORIES

1. SOME NEW GOLD SALTS OF HYOSCINE, HYOSCYAMINE, AND ATROPINE
2. THE CHARACTERS AND METHODS OF ASSAY OF THE OFFICIAL HYPOPHOSPHITES
3. NOTE ON THE MYDRIATIC ALKALOIDS
4. PREPARATION OF ACID PHENYLIC SALTS OF DIBASIC ACIDS
5. A NEW METHOD FOR THE ANALYSIS OF COMMERCIAL PHENOLS
6. THE ASSAY OF PREPARATIONS CONTAINING PILOCARPINE
7. PILOCARPINE AND THE ALKALOIDS OF JABORANDI LEAVES
8. A NEW GLUCOSIDE FROM WILLOW BARK
9. THE CONSTITUTION OF PILOCARPINE—Part I.
10. THE COMPOSITION AND DETERMINATION OF CERIUM OXALATE
11. RESEARCHES ON MORPHINE—Part I.
12. OBSERVATIONS RELATING TO THE CHEMISTRY OF THE BRITISH PHARMACOPŒIA
13. MERCUROUS IODIDE
14. THE COMPOSITION OF BERBERINE PHOSPHATE
15. A CONTRIBUTION TO THE PHARMACOGNOSY OF OFFICIAL STROPHANTHUS SEED
16. THE CHEMISTRY OF THE JABORANDI ALKALOIDS
17. A NEW ADMIXTURE OF COMMERCIAL STROPHANTHUS SEED
18. RESEARCHES ON MORPHINE—Part II.
19. THE CONSTITUTION OF PILOCARPINE—PART II.
20. THE CHEMISTRY OF THE BARK OF ROBINTA PSEUDACACIA, *Linn.*
21. THE ANATOMY OF THE BARK OF ROBINIA PSEUDACACIA, *Linn.*
22. A SOLUBLE MANGANESE CITRATE AND COMPOUNDS OF MANGANESE WITH IRON

23. The chemical characters of so-called Iodotannin Compounds
24. The constitution of Pilocarpine—Part III.
25. A new Synthesis of α-Ethyltricarballylic Acid
26. The constituents of the essential oil of Asarum Canadense
27. Derivatives of Gallic Acid
28. The occurrence of Salicin in different Willow and Poplar Barks
29. The constituents of commercial Chrysarobin
30. The constituents of an essential oil of Rue
31. Methyl β-Methylhexyl Ketone
32. Interaction of Ketones and Aldehydes with Acid Chlorides
33. The anatomy of the stem of Derris uliginosa, *Benth.*
34. The chemistry of the stem of Derris uliginosa, *Benth.*
35 The constitution of Pilocarpine—Part IV.
36. Preparation and properties of Dimethylglyoxaline and Dimethylpyrazole
37. The electrolytic reduction of Pheno- and Naphtho-morpholones
38. Chemical examination of Kô-sam Seeds (Brucea Sumatrana, *Roxb.*)
39. Comparative anatomy of the barks of the Salicaceæ—Part I.
40. The constitution of Chrysophanic Acid and of Emodin.
41. The constitution of Epinephrine
42. A Lævo-rotatory modification of Quercitol
43. The constituents of the essential oil of Californian Laurel
44. Some Derivatives of Umbellulone

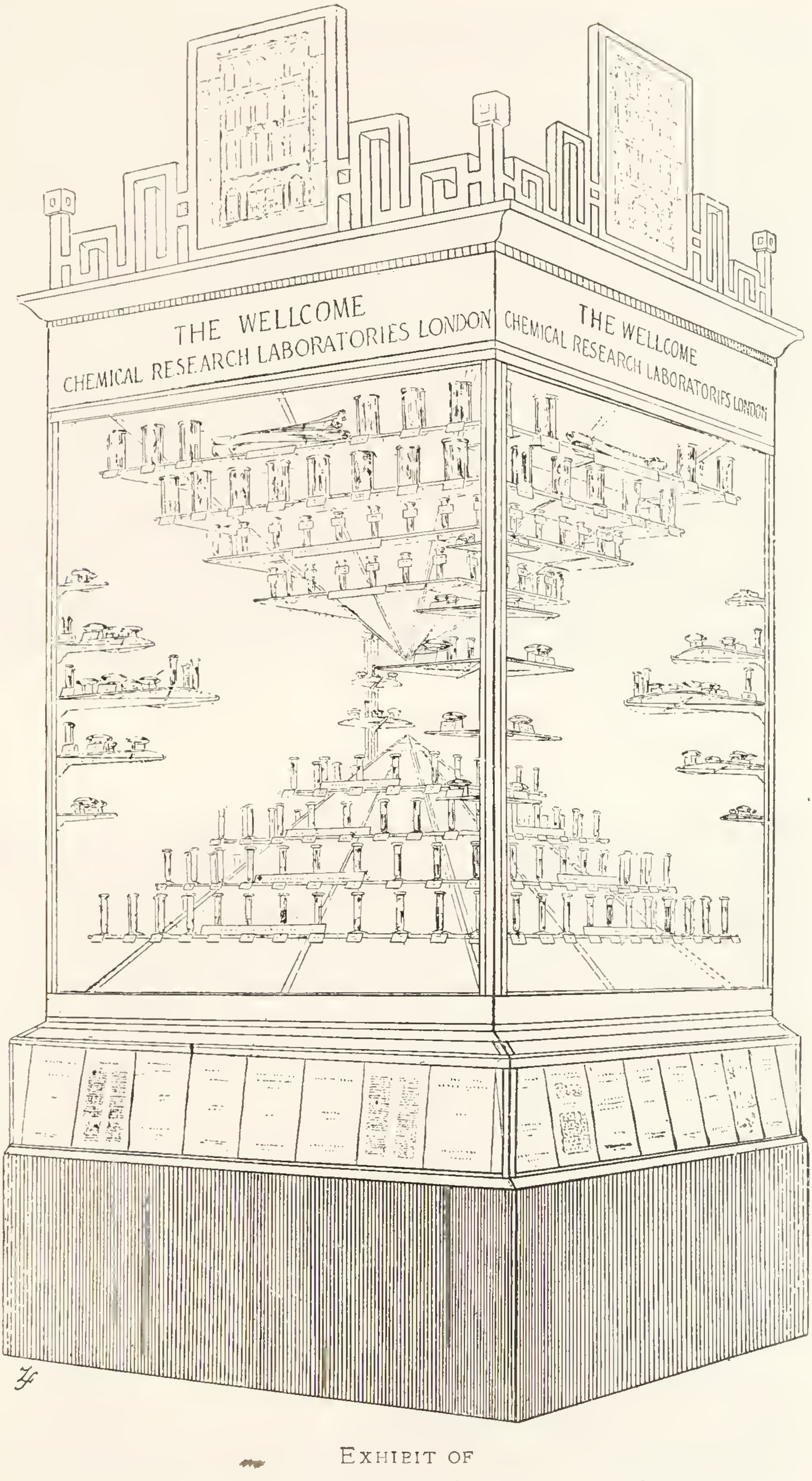

THE WELLCOME
CHEMICAL RESEARCH LABORATORIES LONDON
THE WELLCOME
CHEMICAL RESEARCH LABORATORIES LONDON

Exhibit of
The Wellcome Chemical Research Laboratories, London, Eng.
Liberal Arts Building, British Chemical Section

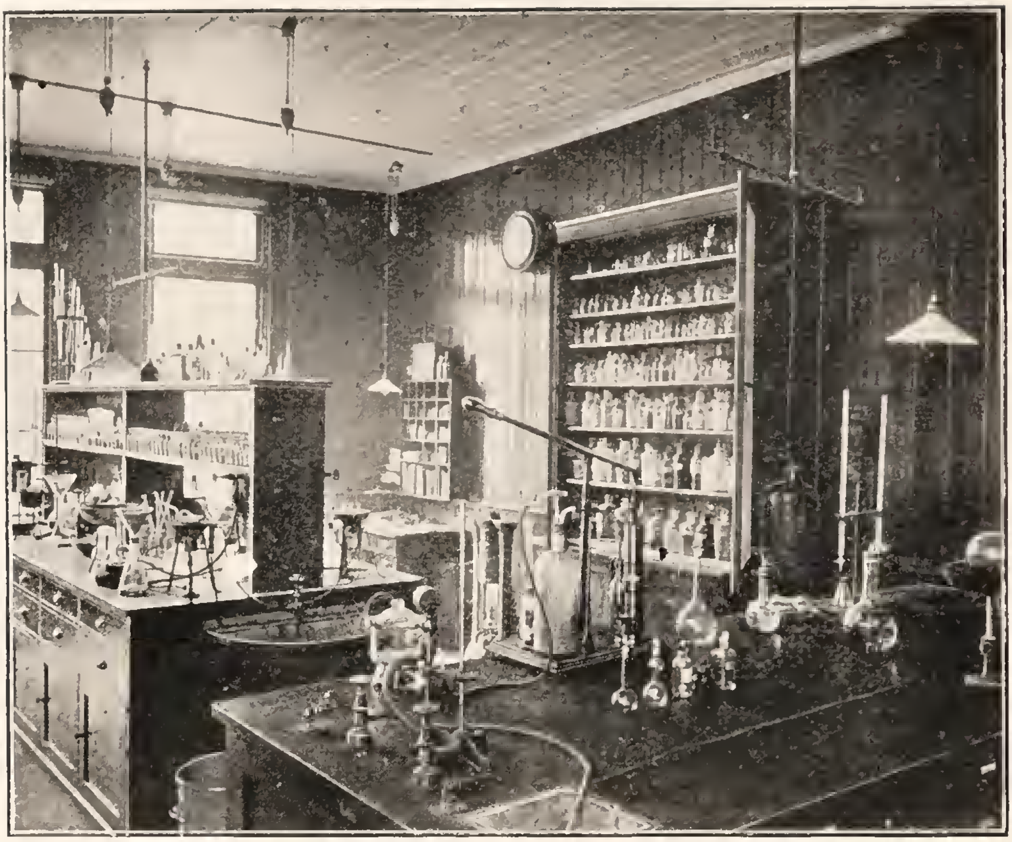


Plate II.

THE LABORATORIES, FIRST FLOOR

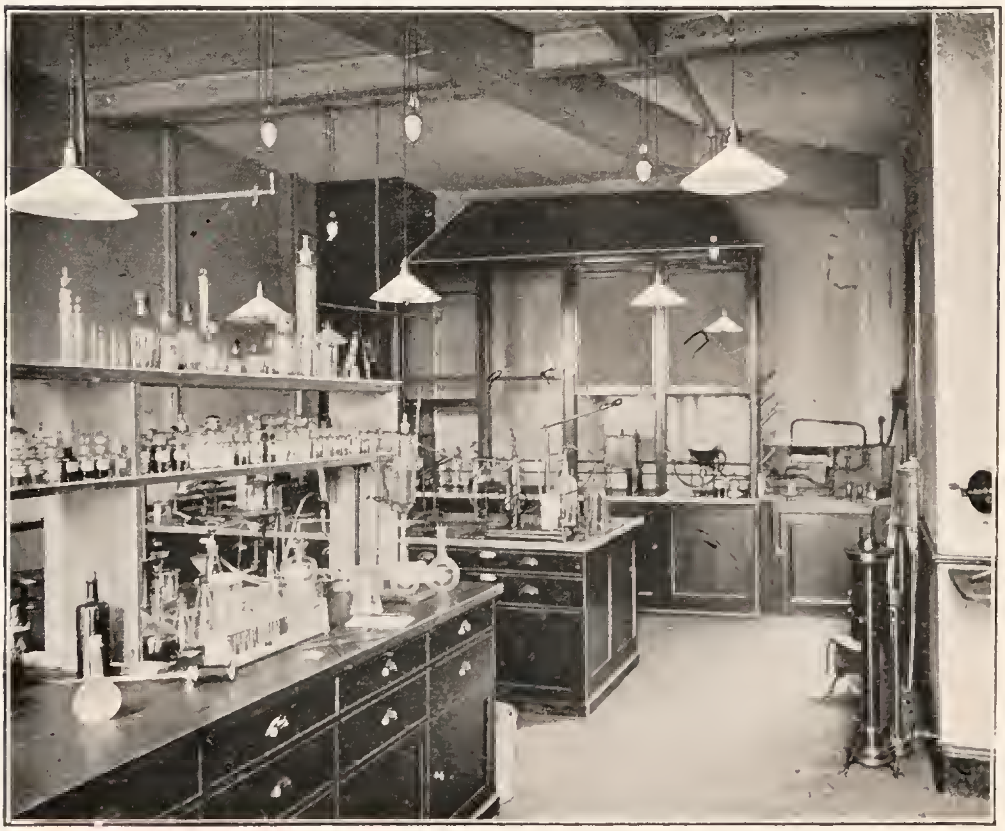


Plate III.

THE LABORATORIES, SECOND FLOOR

Plate IV.

THE LABORATORIES, THIRD FLOOR

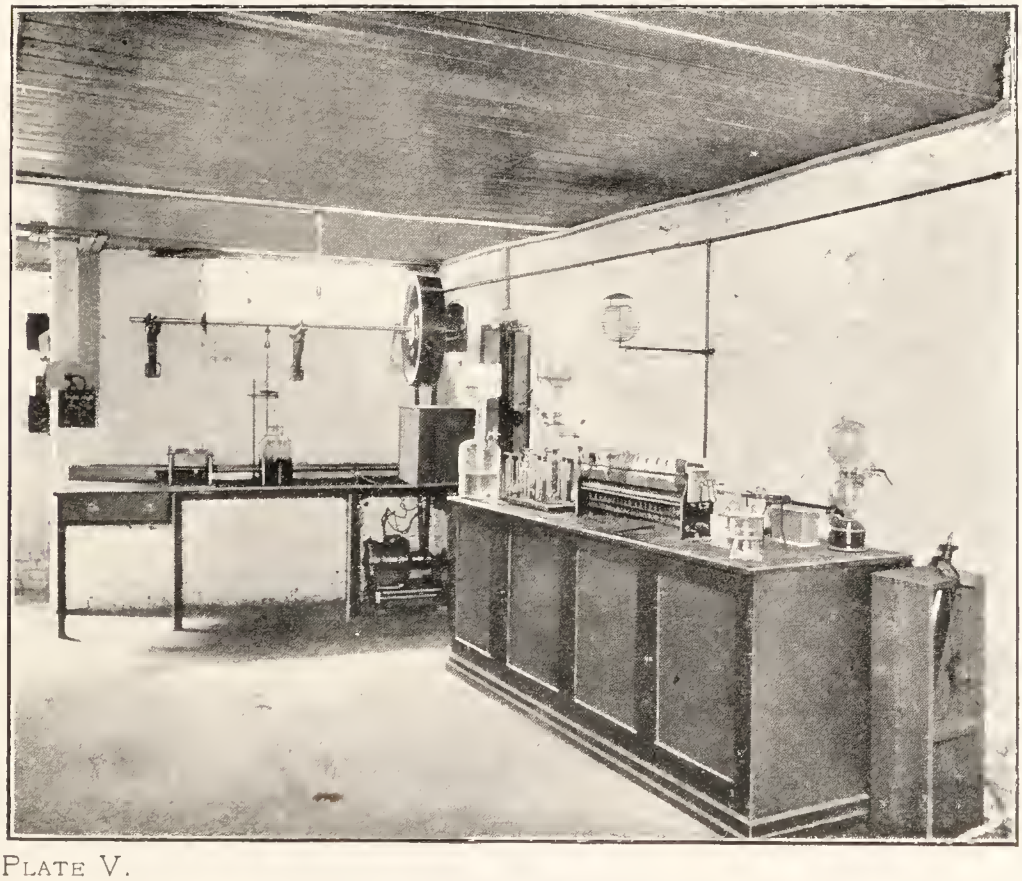


Plate V.

THE COMBUSTION ROOM

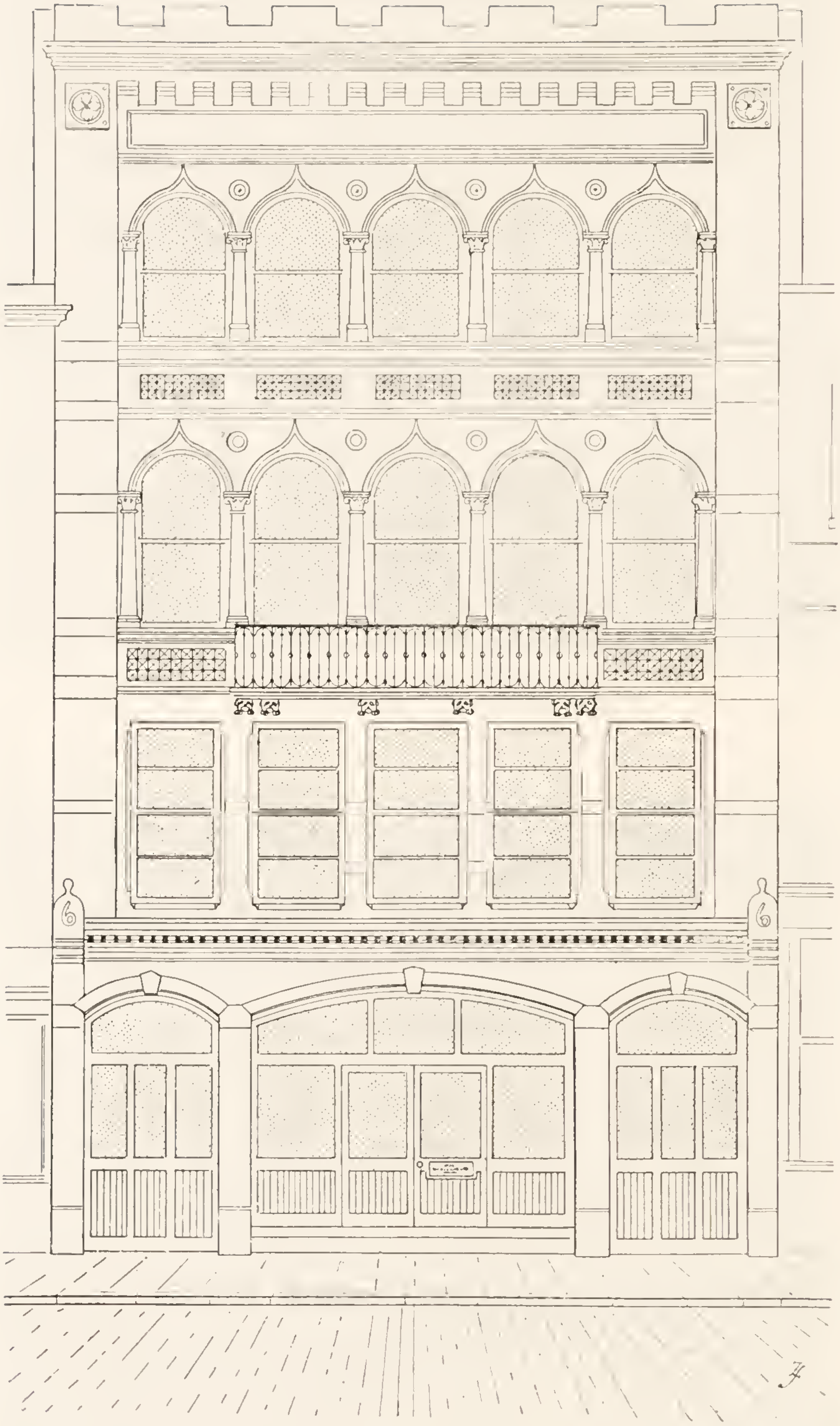


Plate I.

THE WELLCOME CHEMICAL RESEARCH LABORATORIES

THE WELLCOME

CHEMICAL RESEARCH LABORATORIES

ORGANISATION, EQUIPMENT, AND DEVELOPMENT

THOSE who have observed the progress of events in Great Britain during the last decade cannot fail to have been impressed with the remarkable developments and achievements by which it has been attended, especially in the domains of the chemical, physical, and biological sciences. The discovery within the past few years of several new elements in the atmosphere, the liquefaction, and even solidification, of gases that were hitherto regarded as permanent, the synthesis of a number of important organic compounds, the isolation of new substances, and the more precise characterisation of those previously known, together with the perfection of chemical processes and the applications of electricity in chemical and metallurgical operations, are but a few examples of the contributions to knowledge and the industrial progress which have signalised the closing years of the century.

The spirit of research has, in fact, now become so diffused as to have penetrated into almost every department of human knowledge and activity. With a broader recognition of its usefulness, and even of its necessity as an element of progress, research is no longer confined to institutions of learning, but has proved to be a quite indispensable factor in its relation to industrial pursuits, as well as for the study of those important problems in medical science which are so intimately associated with the health and happiness of mankind. It has indeed been truly said that "without a knowledge of the constitution or structure of the molecules which go to make up the substances employed as remedies therapeutics, or the administration of these remedies, can never be an exact science. Thus the research chemist may contribute, though indirectly, his share towards placing medicine upon a real and scientific basis."

It is worthy of note that the year 1896 was marked by the establishment in Great Britain of at least three laboratories devoted exclusively to scientific research—namely, the Davy-Faraday Research Laboratory connected with the Royal Institution, which was formally inaugurated in December, 1896; the new Research Laboratory of the Royal College of Physicians of Edinburgh, which was formally opened in November, 1896; and the WELLCOME CHEMICAL RESEARCH LABORATORIES, which were established in the summer of 1896.

The scope of these laboratories and the directions in which research is conducted in them naturally differ. The first mentioned, for example, is more especially of an academic character, and is therefore devoted to somewhat abstract investigations in chemistry and physics; the second is stated to have for its primary object the examination of morbid specimens and material, the study of zymotic diseases, and, in general, bacteriological, physiological and pathological work; while the third, the WELLCOME CHEMICAL RESEARCH LABORATORIES, are designed for investigations in both pure and applied chemistry, and, in the latter instance, with special reference to the study of that large class of both organic and inorganic compounds which are employed as medicinal agents in the treatment of disease.

The importance of the work which it is the purpose to accomplish in these different, but more or less closely related, departments of science is apparent, and is duly appreciated by those who recognise the deficiencies of existing knowledge.

In response to numerous requests, it has been considered that a brief sketch of the WELLCOME CHEMICAL RESEARCH LABORATORIES, descriptive of their organisation, development, and present equipment, would prove of interest to a considerable number who have not the opportunity of inspecting them.

The first announcement of the plan of Mr. Henry S. Wellcome to establish the chemical research laboratories which bear his name was made on the occasion of a dinner given by him to the present Director, Dr. Frederick B. Power, at the Holborn Restaurant, London, on the evening of July 21, 1896. The occasion was a memorable one in many respects, for the gathering included a large number of distinguished representatives of the various sections of the scientific world. It was then explained by Mr. Wellcome that the work which he proposed to inaugurate was one which he personally had very much at heart, that it would be carried out on no selfish lines, but would be controlled and dictated with the highest regard for science. It was also made clear that the new chemical research laboratories were to be entirely distinct from those of the Works of his firm, in which, as heretofore, research would also continue to be conducted. The expressions of appreciation of the high purpose and the scientific spirit which had actuated Mr. Wellcome in the development of such extended plans for chemical research, as manifested by various distinguished speakers on the occasion referred to, were indeed most auspicious, and fittingly commemorated the inauguration of the work that was to be undertaken.

The first home of the laboratories was in a building situated at No. 42, Snow Hill, but it was soon found desirable to make considerable extensions. In order to accomplish this, it was decided that the laboratories should be transferred to a building of their own, of which they should have complete use and possession. Such premises were secured at No. 6, King Street, Snow Hill, where, in a very central part of London, and amid surroundings replete with many of its most interesting historical associations, the laboratories are now located.

The building is a handsome, modern one of Venetian style of architecture, and comprises four stories and a basement. A view of it is represented by Plate I.

On the ground-floor of the building are the office of the Director and the library, a section of the latter being shown in plate VI. The library is a well-selected one, and quite complete for the special requirements. It contains not only a considerable number of recent chemical and pharmacological works, but also complete sets of many journals, such as the *Journal of the Chemical Society*, *Berichte der deutschen chemischen Gesellschaft*, the *Chemical News*, *Journal of the Society of Chemical Industry*, etc. Files of many of the more important chemical, pharmaceutical and medical periodicals of England, America and Germany are also kept. As several very large and complete scientific and technical libraries are also at all times accessible to members of the staff, it is evident that the requirements in this direction are most abundantly supplied. In the library there is also a cabinet containing specimens of the various substances prepared in the course of laboratory investigations, which already form a collection of considerable interest.

The laboratories proper are located on the first, second and third floors of the building, and are represented in plates II., III. and IV. They are similar in their arrangement, are provided with gas and electricity for both illuminating and heating purposes, and are completely equipped with all the necessary apparatus and appliances for conducting chemical investigations. There are pumps on each table for filtration under pressure, and special adaptations for vacuum distillations. A separate connection with the electric main supplies the current for heating iron plates used for the distillation of ether and other similar liquids. Each laboratory is provided with fine analytical and ordinary balances, which are carefully protected from dust and moisture by tightly-fitting glass cases. There are also telephones on each floor, so that communication between the different laboratories or with the Director's office can be quickly effected.

The basement of the building, which is well lighted by electricity, contains the combustion furnace and all the appliances for conducting ultimate analyses, a large electric motor for working the shaking and stirring apparatus, the drug mill, etc., and a dark-room adapted for polarimetric or photographic work. A view of a portion of the combustion room is shown by Plate V. In direct communication with the basement are dry and commodious vaults, which afford ample room for the storage of the heavier chemicals and the reserve stock of glass-ware, etc. By means of a small lift, articles may be conveniently transported from the basement to any floor of the building.

From this brief description, and the accompanying photographic illustrations, it will be seen that the WELLCOME CHEMICAL RESEARCH LABORATORIES are unique in their appointments and in the purpose they are designed to accomplish.

It is, perhaps, hardly necessary to explain that some of the problems which engage the time and attention of members of the staff—which comprises a number of highly-skilled and experienced chemists—are of technical application, having reference to the perfection of the chemical products of Burroughs Wellcome & Co. These naturally do not always afford material for publication, and many other difficult researches extend over long periods of time. Nevertheless, a considerable number of publications, embodying the results of original work contributed to various scientific societies, which are now consecutively numbered, have already been issued by the laboratories and distributed to institutions and individuals who are considered to be interested in them. Other work in progress will, from time to time, form the subjects of future communications.

Although too short a time has elapsed since the establishment of these laboratories to afford much material for a historical retrospect, their present measure of success enables the hope to be confidently entertained that they will justify the expectations of their founder and of those who are in sympathy with the work which they aim to accomplish.

Reprint from THE TIMES (London)

"The chemical research laboratories which Mr. Henry S. Wellcome has established in King Street are probably *unique* in this country, though institutions of the kind might be multiplied with advantage. Pure scientific research is far from having attained in England the recognition as an instrument of industrial progress and commercial profit which it has achieved in other countries, such as Germany, which as a result now possesses a large trade in chemical products which might have been kept in English hands. These laboratories are intended for investigations both in pure and applied chemistry, with special reference in the latter case to organic and inorganic compounds that may be employed as medicinal agents; but, though Mr. Wellcome is a member of the firm of Burroughs Wellcome and Co., and does not disguise the fact that some of the work done has reference to the requirements of that firm, still, from the nature of the researches already carried out, it is obvious that the laboratories are not ordered in any narrow commercial spirit, and are engaged in many purely scientific inquiries that have no direct commercial significance. The building really contains three laboratories, each of which is complete in itself and is supplied with a full equipment of reagents, apparatus, balances, etc. A library of scientific books and periodicals is also provided. Each of the laboratories accommodates three trained chemists, who are occupied, not with any research that happens to suit their fancy, but with such problems as the director, Dr. Frederick B. Power, thinks may be usefully investigated. The results of such researches have been communicated to learned societies, such as the Chemical Society and the Society of Chemical Industry, and the papers are also issued by the laboratories, and forwarded to institutions and individuals to whom it is considered they may be of interest."

Reprint from Press Report

THE DINNER GIVEN TO DR. FREDERICK B. POWER

ON THE OCCASION OF THE FOUNDING OF

THE WELLCOME

CHEMICAL RESEARCH LABORATORIES

JULY 21, 1896

A noteworthy step has been taken by Mr. Henry S. Wellcome, of the firm of Messrs. Burroughs Wellcome and Co., of London, in the establishment of chemical research laboratories, under circumstances which give promise of important results. For the direction of this undertaking, Mr. Wellcome has selected Dr. Frederick B. Power, formerly of the Wisconsin State University, who has had a distinguished career in connection with research chemistry and pharmacognosy, and was one of the principal technical workers in the revision of the United States Pharmacopœia. In honour of Dr. Power, and to celebrate the occasion, a dinner was given by Mr. Wellcome.

About fifty gentlemen, distinguished in chemical, medical, and allied branches of science, sat down to dinner in the Duke's Salon of the Holborn Restaurant, Mr. Wellcome presiding. The handsome antique salon was tastefully decorated, and behind the chairman the Union Jack and the Stars and Stripes of America were intertwined.

TOASTS

"THE QUEEN"

Professor Alexander Kerr, M.A., of Wisconsin University, proposed "The Queen" in a hearty and effective speech. He related how, some years since, there came into the circle of professors of his University the guest of the evening. With his quiet and courtly manners Dr. Power had captured their affections at once. He continued his professorship for nine years, during which time he successfully organised a special department of pharmaceutical chemistry. Then, to their profound regret, he resigned in order to give more time to research. A report of that evening would give great pleasure to his colleagues at the University where Dr. Power had so brilliantly distinguished himself.

"THE PRESIDENT"

Mr. Charles Umney, F.I.C., F.C.S., proposed "The President of the United States." After speaking of the bonds of affection which would always join the two great English-speaking peoples, he said that, as regards Dr. Power, he trusted that distinguished investigator's work on this side of the ocean would be as successful as it had been on the other.

"THE TOAST OF THE EVENING"

Mr. Wellcome proposed the toast of the evening. He said that Dr. Power, whom they had the pleasure of welcoming that night, had been a close personal friend of his since his boyhood. They were class-mates together at the Philadelphia College of Pharmacy. At the same time, he felt that while they were class-mates Power was his teacher. Power developed at a very early age that peculiar genius which had so influenced his work through life, so that, whilst he was a student at college, he was yet a teacher of his fellows. They were all impressed with the brilliancy of his work and the modesty of his manner. He carried off the laurels at that institution, taking the highest prize for his chemical work, and, young as he was at that time, he became the chief of Professor Parrish's laboratory. Under the guidance of that distinguished man, as well as under those other great teachers whom they were both privileged to have as instructors—Professors Bridges, Procter, and Maisch, all of whom had since passed away—he showed his first marked inclination for research, and he was urged by his fellows to follow a professional career.

Soon after he graduated at the Philadelphia College, Power went to Germany, where, after a full course at the Strasburg University, he took the degree of Doctor of Philosophy, and became first assistant to that eminent scientist, Professor Flueckiger. On one occasion, Professor Flueckiger expressed to him (Mr. Wellcome) the opinion that if he had ever known a genius in research work, that genius was Dr. Power. The conscientiousness, thoroughness, and accuracy of his work, and his fertility of mind, had undoubtedly impressed his former teacher.

Returning to America, Power was appointed demonstrator of analytical chemistry at the Philadelphia College of Pharmacy, but was soon after called to the professorship at the Wisconsin University to which Professor Kerr had referred. This position he filled for nine years with great distinction. Then, resigning his professorship, he accepted a tempting offer from the firm of Messrs. Schimmel and Co., and undertook the direction of their American laboratories. His researches had been characterised from first to last by thoroughness and accuracy.

When a subject had been taken up by Power, even if it had apparently been exhausted by others, he found something more, but no one who had ever followed him in his researches had much chance of finding that he had missed anything. He (Mr. Wellcome) had long been engaged in important researches, but he found many difficulties in connection with carrying out complex investigations at his works ; and though research at his works was important and would always be continued, he resolved on establishing special chemical research laboratories, and had succeeded in inducing Dr. Power to take the directorship and complete control of this institution, which was entirely *separate* and *distinct* from his firm's business. Dr. Power would be supported by a staff of able chemists, and he knew that the work done would be most thorough and exhaustive.

Dr. Power had already selected Dr. Jowett as a member of his staff, and that gentleman was known to most of them for the large number of prizes he had taken in his short career, and for the splendid work he had done. He (Mr. Wellcome) was sure that they all appreciated the importance of research work. It was a matter which he personally had very much at heart, and he felt that with such a director as Dr. Power, assisted by such a staff as he would draw about him, he would be able to ascertain something which might be of value to the world at large. That work would be carried out on no selfish lines. It would be controlled and dictated with the highest regard for science, and the personality of those interested ought to be a sufficient guarantee for its success.

They knew that from the earliest dawn of creation man had regarded with awe the phenomena of Nature, and the wonderful works of the Almighty with which he was surrounded, and, groping after light and knowledge, he had tried to pierce those mysteries. But it was only within our own age that man, now perhaps better endowed with genius, had the audacity to face Nature thoroughly and fearlessly, and attempt to wrest from her her profoundest secrets. This had been done with wonderful success, and none would dare to predict where that work of investigation would end. He asked them to drink most heartily to the guest of the evening, Dr. Power.

RESPONSE

Dr. Power, who was most cordially received, said in response : " Mr. Wellcome and Gentlemen, realising fully the significance of this occasion, it is difficult for me to adequately express my appreciation of the kind and cordial sentiments which have here been spoken, and which have deeply stirred my emotions. It is certainly to me a great pleasure and privilege to be introduced in such a felicitous manner to so many distinguished representatives of science and art, and to be able to form the personal acquaintance of those so highly esteemed and honoured in the professions which you severally represent.

" In coming among you, it is my desire to contribute what little I can to that branch of chemical science which is so intimately associated with the professions of medicine and pharmacy, and to which some years of my life have already been devoted. In thus joining my efforts with yours, I am impressed with the fact that in the aims and pursuits of scientific work we are restricted by no narrow or disputed geographical boundaries, for as there exists a language common to all civilised nations in which chemical facts may be expressed, so I feel that we are bound together by a common purpose, which is the advancement of knowledge and the development of such of the resources of nature as may confer blessing and benefit to our fellow men.

" In this great city with its teeming activity, one is not only impressed with the broad opportunities which it offers through its vast libraries, its museums, and its renowned institutions for the promotion of every department of human learning, but also with the associations which cluster round its historic past. It is an inspiration to recall in memory some of the events connected with the labours of those who at one time, and to some extent, were strangers like myself in the great metropolis, as possibilities are thus suggested to which, perhaps in a smaller measure, we may be permitted to aspire, and which at least afford subjects that are worthy of most earnest emulation."

Reviewing the labours of Professor Hofmann and Professor Auguste Kekulé, Dr. Power recalled the circumstance that it was in the course of the long rides which he was wont to take on the top of a London omnibus that Kekulé first conceived the remarkable and most interesting theory concerning the structure or configuration of the benzene molecule as represented by the alternate single and double linkage of its carbon atoms in the hexagonal ring.

The achievements of those who were at one time, or of others who are now, such active scientific workers, chiefly served to impress them with the magnitude of the work which still remained to be performed. Lord Kelvin had said that one word characterised the most strenuous of the efforts for the advancement of science that he had made perseveringly for fifty years, and that was "failure." But what splendid compensations for philosophical failures they had in the admirable discoveries regarding the properties of matter, and in the application of science to the benefit of mankind, with which those fifty years had abounded.

In conclusion, Dr. Power said: "And now, Mr. Wellcome and Gentlemen, with the contemplation of these few thoughts, and with the assurance of my grateful recognition of the honour which your presence here this evening has conferred upon me, I shall enter upon the duties in my new sphere of labour, not only with an earnestness of purpose, but with the hope that in after years it may be possible to say that they were faithfully performed. It will also be my special desire that the work to be accomplished in the Wellcome Research Laboratories shall always be of such a character as to reflect credit upon the scientific spirit, the enterprise, and the noble generosity of him to whom their foundation is due, and whose name they bear."

"SCIENCE UNIVERSAL"

Mr. Fletcher Moulton, Q.C., F.R.S., in a speech of much humour, proposed "Science Universal."

RESPONSE

Professor D. E. Hughes, F.R.S., in responding, warmly welcomed Dr. Power to this country.

"MEDICAL SCIENCE"

Mr. Newton Crane proposed "Medical Science," and associated with the toast the name of Dr. Sydney Ringer, who has made the demonstration of therapeutic science something of great value to humanity.

RESPONSE

Dr. Sydney Ringer, M.R.C.S., F.R.S., after referring to the recent rapid strides in medicine and chemistry, said : "We welcome you here to-night, Dr. Power, as a distinguished man of science, and we hope you will continue your distinguished career here. We welcome you here—I speak with deep feeling on my own part—as men who are always glad to welcome Americans upon their merit, and as coming from a great country and a great people."

"CHEMICAL INDUSTRY"

Professor P. Carmody, F.I.C., F.C.S., of Trinidad, proposed "Chemical Industry."

RESPONSE

Mr. David Howard, F.C.S., F.L.S., replied, saying that he had a somewhat long record in chemical industry. He had himself made quinine for forty years, and he began to make it when he was twelve years of age. His father and his grandfather had carried on the manufacture of chemicals before him. One thing that they had learned was that chemical industry depended entirely upon pure science, and, depending as it did upon science, it was not the matter of any one locality or nation, but of all humanity. Any little chemistry he knew he owed to his great teacher, Dr. Hofmann ; and therefore he, at any rate, owed a debt to other than Englishmen. The more one knew of one's neighbours, the more one recognised that knowledge was a whole, and that no nation had any peculiar right to the whole of it. And upon the point that it was pure science that made applied science, let there be no mistake—they could not put too high science to work. If they were to have the best and highest applied science, they must put Pegasus himself in the yoke.

He felt that the highest scientific skill was not exercised in vain when it was employed for the good of humanity, and it was not a secret confined to one or another, but open to all, and recognised by none more clearly or more practically than by the great firm of which the chairman was the head. It was only in keeping with the past history of that firm that he should have chosen so able and so scientific a man as Dr. Power to assist them in research.

Might he say, again drawing upon his own experience, that it was the greatest mistake to suppose that even in the simplest things they could do without research ? They had the text-books certainly, but the manufacturer who knew no more than the text-books was indeed done for—and it was only by research that they could learn more than their text-books told them. He cordially welcomed Dr. Power as one who had fully recognised that great truth which alone could make a future for applied chemistry.

"THE PRESS"

Professor Meldola, F.R.S., F.I.C., F.C.S. (Technical College, Finsbury), in proposing the toast of "The Press," said that if he might make a digression he would like to express his very great satisfaction at being the means of stating how keenly they appreciated the enlightenment which had led their host to inaugurate that most important departure among the long list of his industrial achievements. It was a departure which he was sure would bear the most important fruit, and there was no branch of industry which would not benefit by such a departure if they were fortunate enough to secure such an expert as Dr. Power.

RESPONSE

Dr. B. H. Paul, F.C.S. (Editor *Pharmaceutical Journal*), replying to the toast, said that they must be grateful for the participation of the great continent of America in chemical science within recent years. He was glad to say that the impulse that had been exercised in that direction was about to be supplemented by bringing over to this country Professor Power to take the direction of the Wellcome Research Laboratories. That was a step which he thought was a worthy supplement to the stimulus which had undoubtedly been already produced by the famous house of Burroughs Wellcome and Co. They had imported Dr. Power as an infectious element, and he hoped that the work which he would do would breed an infection that would seize upon some of our own people. He heartily congratulated Mr. Wellcome upon the wise step which he had taken, and wished him all success in the prosecution of it.

"THE CHAIR"

Mr. A. Gordon Salamon, A.R.S.M., F.I.C., F.C.S., in proposing the toast of "Our Host," said he was gratified that Mr. Wellcome, having achieved a considerable position in the world of industrial chemistry, took pride in associating himself with its purely scientific development, and having endowed himself for research, he was going to equip others, whom he would select with the greatest possible care, to add to that variety of knowledge which, he need not say, is most sadly needed in this country. With Dr. Power as director, this important departure was in very safe hands. The speeches all focussed towards the same point, which was the sympathy which they all felt with Mr. Wellcome's plans, and he did not think he need say more than to ask them to drink with all sincerity to the health of one who had the courage to inaugurate such a movement, and who, by the evidence which he had given in the past, and by the experience which he had gained, would be absolutely sure to carry it to a successful issue.

Mr Wellcome responded briefly.